

Exhibit 16



1344.40448X00
NC 32375 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Miska HANNUKSELA
Serial No.: 09/924,582
Filed: August 9, 2001
For: VIDEO CODING
Art Unit: 2613
Examiner: Charles E. Parsons

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

July 15, 2005

Sir:

This is in response to the Office Action of April 15, 2005. Please amend the above-identified application as listed below and as set forth on the following pages:

Amendments to the Claims

Remarks are included following the amendments

07/18/2005 HALI11 00000063 09924582

01 FC:1201 1200.00 OF
02 FC:1202 950.00 OF

Amendment to the Claims:

The listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of encoding a video signal representing a sequence of pictures to form an encoded video signal, the method comprising receiving a first picture or a part thereof, encoding at least part of the first picture or said part thereof, using a first encoding mode, of a sequence without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof, and encoding said at least part of the first picture or said part thereof, using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.

2. (Currently Amended) A method according to claim 1, wherein every picture or part thereof encoded without reference to another picture is also encoded with reference to another picture of the sequence to form a corresponding temporally predicted second encoded representation of each respective picture or part.

3. (Original) A method according to claim 1, wherein said first picture or part thereof is encoded with reference to another picture occurring in the sequence temporally prior to said first picture.

4. (Original) A method according to claim 1, wherein said first picture or part thereof is encoded with reference to another picture occurring in the sequence temporally after said first picture.

5. (Original) A method according to claim 1, wherein said first picture or part thereof is encoded with reference to one or more other pictures occurring in the sequence.

6. (Currently Amended) A video encoder comprising
an input for receiving a video signal representing a sequence of pictures, the encoder being arranged to encode a first picture of the sequence or a part thereof, received at the input, using a first encoding mode, without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof, and to encode said first picture or said part thereof, using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.

7. (Currently Amended) A video codec including a video encoder according to claim 6, the video encoder comprising an input for receiving a video signal representing a sequence of pictures, the encoder being arranged to encode a first picture of the sequence or a part thereof, received at the input, using a first encoding mode, without reference to another picture of the sequence to form a first

encoded representation of the first picture or said part thereof, and to encode said first picture or said part thereof, using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.

8. (Currently Amended) A multimedia system including a video encoder ~~according to claim 6, the video encoder comprising an input for receiving a video signal representing a sequence of pictures, the encoder being arranged to encode a first picture of the sequence or a part thereof, received at the input, using a first encoding mode, without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof, and to encode said first picture or said part thereof, using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.~~

9. (Currently Amended) A method of encoding a video signal representing a sequence of pictures to form an encoded video signal, the method comprising receiving a segment of a first picture or part thereof, encoding at the segment of at the first picture or part thereof of the sequence using a first encoding mode without reference to another picture of the sequence to form a first encoded representation of the first picture segment or said part thereof, and encoding at least said segment of said first picture or part thereof using a second encoding mode with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture segment or said part thereof.

10. (Currently Amended) A method of video decoding comprising receiving an encoded video signal representing encoded pictures of a video sequence, the encoded video signal comprising a first encoded representation of a first picture or a part thereof, said first encoded representation having been formed, using a first encoding mode, by encoding said first picture or said part thereof without reference to another picture of the sequence, the encoded video signal further comprising a temporally predicted second encoded representation of the first picture or said part thereof, said temporally predicted second encoded representation having been formed, using a second encoding mode, by encoding said first picture or said part thereof with reference to another picture of the sequence, the method comprising determining whether a picture that is not temporally predicted or part of a picture that is not temporally predicted has been corruptedthe first encoded representation of the first picture or said part thereof can be decoded and, if not, monitoring the received encoded video signal for athe temporally predicted second encoded representation of the first picture or said part thereof and, on receipt of the temporally predicted second encoded representation of the first picture or said part thereof, decoding the temporally predicted second encoded representation of the first picture or said part thereof with reference to said another picture.

11. (Currently Amended) A video decoder comprising:
 an input for receiving an encoded video signal representing encoded pictures of a video sequence, the encoded video signal comprising a first encoded representation of a first picture or a part thereof, said first encoded representation

having been formed, using a first encoding mode, by encoding said first picture or said part thereof without reference to another picture of the sequence, the encoded video signal further comprising a temporally predicted second encoded representation of the first picture or said part thereof, said temporally predicted second encoded representation having been formed, using a second encoding mode, by encoding said first picture or said part thereof with reference to another picture of the sequence, said video decoder being arranged to determine determining whether a non-temporally predicted frame or part thereof has been corrupted the first encoded representation of a first picture or said part thereof, received from the input, can be decoded and, if so not, to monitoring the received encoded video signal for a the temporally predicted second encoded representation of the first frame picture or said part thereof and, on receipt of a the temporally predicted second encoded representation of the first frame picture or said part thereof, to control decoding of the temporally predicted second encoded representation of the frame first picture or said part thereof with reference to said another frame picture.

12. (Currently Amended) A portable electronic device incorporating a video encoder ~~according to claim 6~~, the video encoder comprising an input for receiving a video signal representing a sequence of pictures, the encoder being arranged to encode a first picture of the sequence or a part thereof, received at the input, using a first encoding mode, without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof, and to encode said first picture or said part thereof, using a second encoding mode, with reference

to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.

13. (Currently Amended) A multimedia system including a video codec ~~according to claim 7,~~ the video encoder comprising an input for receiving a video signal representing a sequence of pictures, the encoder being arranged to encode a first picture of the sequence or a part thereof, received at the input, using a first encoding mode, without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof, and to encode said first picture or said part thereof, using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.

14. (Currently Amended) A portable electronic device incorporating a video decoder ~~according to claim 11,~~ the video decoder comprising:

an input for receiving an encoded video signal representing encoded pictures of a video sequence, the encoded video signal comprising a first encoded representation of a first picture or a part thereof, said first encoded representation having been formed, using a first encoding mode, by encoding said first picture or said part thereof without reference to another picture of the sequence, the encoded video signal further comprising a temporally predicted second encoded representation of the first picture or said part thereof, said temporally predicted second encoded representation having been formed, using a second encoding mode, by encoding said first picture or said part thereof with reference to another

picture of the sequence, said video decoder being arranged to determine whether the first encoded representation of a first picture or part thereof, received from the input, can be decoded and, if not, to monitor the received encoded video signal for the temporally predicted second encoded representation of the first picture or said part thereof and, on receipt of the temporally predicted second encoded representation of the first picture or said part thereof, to control decoding of the temporally predicted second encoded representation of the first picture or said part thereof with reference to said another picture.

15. (Currently Amended) ~~The A~~ system comprising a video encoder according to claim 6 and a video decoder, according to claim 11.

the video encoder comprising:

an input for receiving a video signal representing a sequence of pictures, the encoder being arranged to encode a first picture of the sequence or a part thereof, received at the input, using a first encoding mode, without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof, and to encode said first picture or said part thereof, using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof,

the video decoder comprising:

an input for receiving an encoded video signal representing encoded pictures of a video sequence, the encoded video signal comprising a first encoded representation of a first picture or a part thereof, said first encoded representation

having been formed, using a first encoding mode, by encoding said first picture or said part thereof without reference to another picture of the sequence, the encoded video signal further comprising a temporally predicted second encoded representation of the first picture or said part thereof, said temporally predicted second encoded representation having been formed, using a second encoding mode, by encoding said first picture or said part thereof with reference to another picture of the sequence, said video decoder being arranged to determine whether the first encoded representation of a first picture or said part thereof, received from the input, can be decoded and, if not, to monitor the received encoded video signal for the temporally predicted second encoded representation of the first picture or said part thereof and, on receipt of the temporally predicted second encoded representation of the first picture or said part thereof, to control decoding of the temporally predicted second encoded representation of the first picture or said part thereof with reference to said another picture.

16. (New) A video encoder according to claim 6, comprising a controller arranged to control processing means to encode a first picture or a part thereof received at the input.

17. (New) A video decoder according to claim 11, comprising a controller arranged to control processing means to decode a video signal received at the input.

18. (New) A video encoder according to claim 6, wherein the first encoding mode is an INTRA coding mode.

19. (New) A video encoder according to claim 6, wherein the second encoding mode is an INTER coding mode.

20. (New) A video encoder according to claim 6, wherein the second encoding mode provides a P frame.

21. (New) A video encoder according to claim 6, wherein the second encoding mode provides a B frame.

22. (New) A video encoder according to claim 6, wherein the second encoding mode is a forward prediction mode.

23. (New) A video encoder according to claim 6, wherein the second encoding mode is a backward prediction mode.

24. (New) A video encoder according to claim 16, wherein the controller is arranged to determine which picture is to be encoded in the first encoding mode based on feedback signalling from a decoder.

25. (New) A video encoder according to claim 16, wherein the controller is arranged to determine which picture is to be encoded in the first encoding mode based on prediction error.

26. (New) A video encoder according to claim 6, wherein the first picture or part thereof is associated with a scene cut.

27. (New) A video encoder according to claim 6, wherein the first picture or part thereof is associated with the very first picture of a video sequence.

28. (New) A video encoder according to claim 16, wherein the controller is arranged to control processing means to encode said first picture or part thereof in said first encoding mode at regular periodic intervals.

29. (New) A video encoder according to claim 6, wherein said other picture corresponds to the picture temporally closest to the first picture or said part thereof, said temporally closest picture or part thereof to be encoded in the first encoding mode.

30. (New) A video encoder according to claim 6, wherein the encoder is arranged to transmit encoded pictures or parts thereof in the order in which the pictures or said parts thereof are encoded.

31. (New) A video encoder according to claim 6, wherein the encoder is arranged to transmit pictures encoded in the first mode in groups without interspersing pictures encoded in a mode other than the first mode.

32. (New) A video encoder according to claim 6, wherein said other picture is a picture encoded in the first mode.

33. (New) A video encoder according to claim 6, wherein the video encoder is arranged to encode a third representation of the first picture or said part thereof, the third representation being encoded with respect to a different other picture than the second representation.

34. (New) A video encoder according to claim 16, wherein the encoder comprises a switch arranged to allow switching of the processing means between the first and second encoding modes.

35. (New) A decoder according to claim 11, wherein the decoder is arranged to discard the second representation of the first picture or said part thereof if the first representation has been previously decoded.

36. (New) A method of encoding a video signal according to claim 1, wherein the first picture or part thereof is associated with a scene cut.

37. (New) A method of encoding a video signal according to claim 1, comprising encoding a third representation of the first picture or said part thereof, the third representation being encoded with respect to a different other picture than the second representation.

38. (New) A method of decoding a video signal according to claim 10, wherein the first picture or part thereof is associated with a scene cut.

39. (New) A method of decoding a video signal according to claim 10, comprising decoding a third representation of the first picture or said part thereof, the third representation being encoded with respect to a different other picture than the second representation.

REMARKS

The present invention is a method of encoding a video signal representing a sequence of pictures to form an encoded video signal, a video encoder, a video codec, multimedia system, a method of video decoding, a video decoder, a portable electronic device incorporating a video encoder, the multimedia system including a video codec, a portable electronic device incorporating a video decoder, and a system comprising a video encoder and a video decoder. A method of encoding a video signal representing a sequence of pictures to form an encoded video signal in accordance with an embodiment of the invention includes receiving a first picture or a part thereof, encoding first picture or said part thereof using a first encoding mode without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof, and encoding said first picture or said part thereof using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoding representation of the first picture or said part thereof.

Reconsideration of the restriction requirement is respectfully requested. Submitted herewith is a system claim containing the subject matter of claim 15 as previously presented and claims 10, 11 and 14 pertaining to video decoding which have been previously removed by the Examiner's restriction requirement. In view of the arguments pertaining to the patentability of the encoding methodology, as set forth in all of the claims, including the claims pertaining to decoding, it is requested that the Examiner reconsider the finality of the restriction requirement and permit examination of those claims which are patentable for the reasons set forth below.

Claim 15 stands objected to for improper multiple dependency. The subject matter of claim 15 has been rewritten to recite the subject matter of claims 6 and 11 which the Examiner considered to be an improper multiple dependent claim.

Claims 1-7 and 9 stand rejected under 35 U.S.C. §102 as being unpatentable over United States Patent 6,591,041 (Ueda). These grounds of rejection are traversed for the following reasons.

Each of the independent claims 1 and 6-15 recites, inter alia, substantively the encoding of a video signal representing a sequence of pictures to form an encoded video signal from a first picture or a part thereof using a first encoding mode and encoding the first picture or the part thereof using a second encoding mode with reference to another picture of the sequence to produce the corresponding temporally predicted second encoded representation of the first picture or the part thereof. This subject matter has no counterpart in Ueda.

Ueda discloses in the referenced portions of column 2 and column 4, upon which the Examiner has relied, the encoding of a moving picture into INTRA-frames, a part of frames sandwiched between contiguous INTRA-frames into forward predicted frames and frames sandwiched between a forward predictive frame and another forward predictive frame or an INTRA-frame into a bidirectionally predictive frames which are respectively referred to as I, P, B frames. This encoding methodology utilizes only a single encoding mode in contrast to the claimed invention which provides for encoding of a picture or a part thereof with first and second encoding modes.

It is submitted that a person of ordinary skill in the art would not be led to modify the teachings of Ueda to arrive at the subject matter of claims 1-7 and 9.

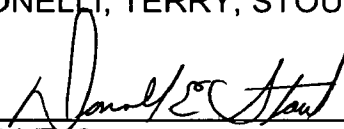
Claims 8, 12 and 13 stand rejected under 35 U.S.C. §103 as being unpatentable over Ueda in view of United States Patent 6,028,631 (Nakaya et al). Nakaya et al has been cited as disclosing a multimedia system and portable electronic device including a video encoder. The teachings of Nakaya et al do not cure the deficiencies noted above with respect to Ueda.

In view of the foregoing amendments and remarks, it is submitted that each of the claims in the application is in condition for allowance. Accordingly, early allowance thereof is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (1344.40448X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



Donald E. Stout
Registration No. 26,422
(703) 312-6600

DES:dlh